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January 15, 1949

# SCIENCE NEWS LETTER

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THE WEEKLY SUMMARY OF CURRENT SCIENCE

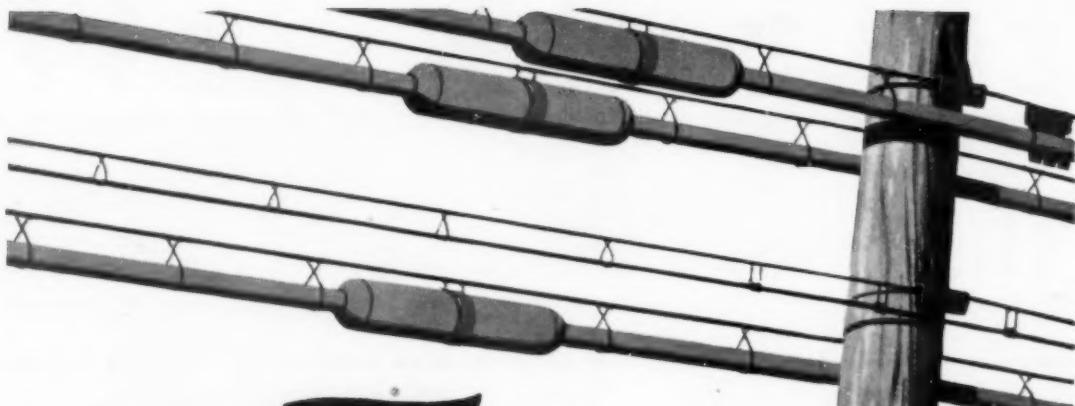
Atomic Time

See Page 35

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## The case of the Creeping Sleeve

Lead sheathing on telephone cable meets many stresses—the tug of its own weight, wind pressure, contraction and expansion from cold and heat. Then, too, there's the pressure of nitrogen gas put in Long Distance cable to warn of sheath breaks and keep out moisture.

And, sometimes, lead is subject to "creep"—a permanent stretching—even when the stress is but a fraction of the normal tensile strength. Creep is especially likely at the lead sleeves used where two lengths of cable are joined. The sleeve may stretch and break open exposing telephone circuits to the elements.

So Bell Laboratories scientists have developed methods to test and control creep. In a special testing room, weights are applied to scores of samples of lead, under controlled conditions. Exact records of the amount of creep are obtained with a precision instrument.

Years of careful study have produced a lead composition which resists creep and yet has all the other properties required of sleeves. This means better telephone service for you and helps give that service at lowest possible cost. It is an example of the way Bell Telephone Laboratories scientists study and improve every part of the great telephone plant.

**BELL TELEPHONE LABORATORIES**

EXPLORING AND INVENTING, DEVISING AND PERFECTING, FOR CONTINUED IMPROVEMENTS AND ECONOMIES IN TELEPHONE SERVICE.



## PHYSICS

# Atoms Control New Clock

This revolutionary instrument is independent of astronomical calculations and promises advances in radio, astronomy and materials study.

## See Front Cover

► AN ATOMIC clock which tells time by the movements of atoms in molecules of ammonia has been demonstrated by scientists at the National Bureau of Standards.

The new clock will not find its way to your mantle or wrist, but you may sometime get a greater choice of radio broadcasts in your home and countless other developments from this revolutionary instrument.

Here are some of the possibilities which may come from use of the clock that tells time with atoms:

More radio stations because of better control of the limited room on broadcasting bands. Atomic control of higher frequencies will aid radar, other microwave equipment and television relays.

More accurate answers to countless problems in astronomy, including, "How long is a year?" That one is what causes the confusion over the calendar and gives us a leap year that is not entirely satisfactory to science.

Better analysis of materials in chemistry and medicine, plastics, rubber, textiles, oil, food and drugs. The atomic clock will help scientists use their newest and most effective tool for studying molecules, microwave spectroscopy. These techniques are used to identify elements by their vibrations.

Bureau scientists said that the principle used in the atomic clock will greatly improve astronomical observations, long-range navigation and communication systems, precise surveying, military map making and systems where atoms serve as electronic components, including radio filters, telephone relays and radar.

First clock independent of astronomical calculations, the new instrument gets away from using the rotation of the earth on its axis as it revolves around the sun. All previous clocks are based on this, and scientists have found that the earth's rotation is not as reliable as you might suppose. The earth is very gradually slowing down, plus the fact that mysterious changes in the rate of rotation have made days shorter and longer from time to time for no known reason.

Vibrations of atoms in the molecules which they form create spectrum lines which scientists have located in the very-high-frequency region of the radio spectrum where microwaves are found. Ex-

tremely sensitive radio methods make it possible to measure these spectrum lines very precisely. These achievements have made it possible to build a clock which does not depend upon the not-always-reliable earth, and is unaffected by temperature, pressure and aging.

Parts of the atomic clock include a quartz crystal oscillator, a frequency multiplier, a frequency discriminator, a frequency driver, a special 50-cycle clock and a waveguide absorption cell. The cell is a 30-foot copper tube, wound in a compact spiral around the clock and is filled with ammonia gas.

The actual clock is electrically driven, world's most accurate electric clock. A low frequency radio signal is generated by the crystal oscillator and transformed into a microwave signal. This signal is compared with the natural vibration of the ammonia molecule and adjusted to agree with the molecular vibration. The resulting signal controls the electrically-driven clock.

While the atomic clock is in operation, the monitoring oscilloscope continuously displays a trace of the 3,3 absorption line of ammonia. The 3,3 line, strongest of many absorption lines in ammonia, corresponds to the quantum transition in which the quantum numbers J and K both have the value 3. The symmetric output pulse is produced by absorption of the FM control signal as it sweeps across the natural absorption-line frequency of the ammonia gas. The sharpness of this line on the oscilloscope screen is an indication of the time keeping accuracy of the atomic clock, as shown on the cover of this week's SCIENCE NEWS LETTER.

Based on the work of Dr. Harold Lyons, chief of the microwave standards section at the Bureau's central radio propagation laboratory, the new clock has a constancy of better than one part in 20,000,000. Potential accuracy theoretically is rated at one part in 10,000,000,000.

Science News Letter, January 15, 1949

## WILDLIFE

### Alligators' Favorite Meat Found To Be Crayfish

► ALLIGATORS, despite widespread legends, do not feed mainly on little brown babies who stray too close to the water when their mammies aren't looking. Staple food of the grim-looking reptiles is, oddly enough, crayfish. They also eat a good many fish—real fish with fins—



**WORLD'S MOST ACCURATE CLOCK**—Dr. E. U. Condon (left), director of the National Bureau of Standards and Dr. Harold Lyons, who developed the NBS atomic clock, stand before the control panel of the clock. Dr. Condon holds a model of the ammonia molecule which is used in controlling the timekeeping of the clock.

and quite a few turtles and water-snakes of various kinds. Only the big ones, as a rule, can manage meals of warm-blooded meat—birds and mammals, the latter mostly muskrats.

This information was obtained in the course of a systematic study of the alligator life of the Sabine National Wildlife Refuge in Louisiana, conducted by LeRoy W. Giles and Vandiver L. Childs for the U. S. Fish and Wildlife Service, with field headquarters in Sulphur, La. They present a detailed report of their results in the JOURNAL OF WILDLIFE MANAGEMENT, (Jan.).

They had dependable hunters take a sampling of the alligator population of the refuge. Out of more than a thousand alligators killed, nearly nine-tenths were less than five feet in length. This relatively small size helps to account for the predominantly crayfish diet.

Despite the fact that alligators do feed to some extent on the valuable fur-bearing muskrats, the two wildlife researchers do not favor large-scale killing of the big reptiles. They also have a considerable economic value, the report points out, because of their high-priced hides.

Science News Letter, January 15, 1949

Approximately 13,400 miles of snow fences are used in the United States to keep snowdrifts off highways; placed parallel to the road, they break the wind and cause drifts to form between them and the highway.

## AERONAUTICS

# Radar Device for Planes

► ONLY moving aircraft will show on the screens of a new radar device to help planes make all-weather approaches and landings, General Electric revealed in Syracuse, N. Y., at its new Electronics Park where 27 units of the equipment are to be constructed for the U. S. Civil Aeronautics Administration for installations at commercial airports.

This new device is said to be the first of the type to employ "Moving Target Indication" as a standard production feature. This is a unique method of eliminating fixed objects, such as tall towers and neighboring hills, from the radar scope image. Special means, by use of a superimposed chart on the image, enables the tower control operator to determine the proximity of any airplane to a dangerous obstruction.

The equipment is a scanning radar for use with ground-control-approach (GCA) radar-radio apparatus. This war device was successfully used to bring planes of the armed services safely into fog-bound airfields. CAA is now using at least three of these GCA devices to supplement its in-

strument landing system (ILS). The types used by the CAA are much simpler than those employed during the war.

The type that General Electric is under contract to construct may be installed anywhere up to two miles from the airport control tower and, by means of a unique remote system, brings its scope pictures into the tower for the benefit of the traffic controller. The picture he sees will show the exact position and flight path of every plane within a 30-mile radius.

During periods of bad weather and poor visibility this complete picture of all planes flying within the area will make it possible for the controller more safely to conduct each plane to the blind landing radio beam by means of radio conversation. Installations of the new radar sets will begin early in 1950, it is expected, with 22 of them assigned to CAA airport control towers in this country, one in Hawaii, and four in Alaska. The 27 will be constructed under a \$2,840,427 contract.

Science News Letter, January 15, 1949

the study of the Aleuts makes me wonder why similar studies are not made of the tribes and groups of people such as the Hunzas, the native of the Torres Strait Islands, the Indians of Bolivia, the primitive Eskimos and Indians of Alaska, the Bene of the Nigerian Delta, and many others who have been reported to be free or practically free from cancer, to see if they really are free of that disease and to try to learn why they are immune if they are immune. Surely a nation with a forty to fifty billion dollars a year national budget and some of our heavily endowed universities could spare enough money to keep a dozen or more expeditions in the field for several years to do a thorough job of it.—R. S. Moller, Hempstead, N. Y.

Science News Letter, January 15, 1949

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# Letters To The Editor

### Keeping Warm

We have a system similar to the reflective radiant one described in SNL, Dec. 11, which is already in successful operation in our home in the Catskill Mountains.

The wall back of the kitchen stove is covered with this aluminum foil, as is also the opposite end wall, reflecting the heat waves to all parts of the 10 by 15 room 10 feet high.

Wood is used as fuel and no other heat source is necessary. During the cold December weather, when the temperature dropped below zero, it was necessary to keep the windows partly open while my wife was baking to prevent the indoor temperature from soaring into the nineties.—George H. Gabus, Livingston Manor, N. Y.

### Native Immunity

The report in SNL, Nov. 27, regarding

# Question Box

### AERONAUTICS

What is the new radar device for planes? p. 36.

### CHEMISTRY

How can clouds of dust purify air of poisonous fumes? p. 41.

### ENGINEERING

What new process is yielding fuel gas? p. 42.

### GENETICS

What criticism is made of Russia's new theory of genetics? p. 39.

Photographs: Cover, p. 35, National Bureau of Standards; p. 37, General Electric; p. 38, Navy; p. 39, University of California African Expedition; p. 42, p. 43, Bureau of Mines, U. S. Dept. of Interior.

### MEDICINE

What is the new plan of the WHO for checking 'flu epidemics? p. 37.

### PHYSICS

How is the atomic clock expected to help in scientific research? p. 35.

### POPULATION

Why does an expert conclude that the world can't support its present population? p. 41.

### VETERINARY MEDICINE

What offers hope of eradicating foot-and-mouth disease? p. 40.

## MEDICINE

# Flu Outbreaks in Europe

**A new reporting system has been set up by the World Health Organization in the hope that with the aid of collaborating centers epidemics will be checked.**

► IS A world-wide influenza epidemic like that which caused such havoc in 1918 now brewing?

Reports of hundreds of thousands of cases in France following an outbreak that afflicted half a million or more persons in Italy last month raise the question in the minds of health officials as well as laymen.

Here in the United States there are no signs yet of an epidemic. Latest reports to the U. S. Public Health Service show a national total of 2,821 cases for the week ended Jan. 1, which is only a slight increase over the 2,165 reported the preceding week.

World Health Organization officials hope their newly established influenza reporting and information stations will help check the epidemic before it spreads too far.

Object of the system is to detect, as swiftly as possible, the type of influenza virus causing an outbreak wherever it occurs. With this information, health authorities and doctors can be forewarned in time, it is hoped, to vaccinate people against the disease in advance of its spread.

The plan might be defeated by the speed with which influenza spreads. It might also be defeated if the type of virus causing the epidemic is not the same as those now included in commercial vaccines. The type of virus can be determined as quickly as 24 hours from the time material for typing is received in the laboratory. But leading vaccine producers in this country agree it would take seven months to produce the vaccine in large quantities. And they would only guarantee production within seven months if they could get started around the first of October of a year.

Fertile hen's eggs are needed for the vaccine production. The virus is grown on the embryo in the egg. Getting these eggs is not like going to the grocery store and buying a couple of dozen. Orders must be placed with farmers and they face seasonal problems. When the vaccine is finished, it must undergo sterility tests, for safety, before it can be released. These tests take two weeks each, and several must be made in succession.

Some hope of keeping the present outbreak in France from spreading very far appears in the fact that the present vaccines include both A and B types of influenza virus. World Health authorities think the French outbreak is a spread from the one in Italy last month. That was due to type B virus, according to the medical

school at the University of Rome.

Type B virus has been the cause of sporadic cases of influenza in Germany this winter among American troops and civilians attached to the military organization. No signs of an epidemic have been seen yet in Germany. The Army has an elaborate set-up there for influenza detection. Each station hospital there has a staff officer whose special job is to examine all cases suspected of having influenza. When a patient does have 'flu, this officer sends samples of his blood to an Army laboratory at Heidelberg where it is typed.

Venezuela also had a 'flu outbreak last month. This was also type B 'flu, our national Influenza Strain Study Center in New York determined from material sent them for typing. A recent outbreak in Puerto Rico, however, was found due to type A.

Besides the center in New York for determining virus strains, an Influenza Information Center has been set up at the National Institutes of Health in Bethesda, Md. This operates under a commission representing the Surgeon Generals of the Army, Navy, Public Health Service and Air Force. It also collaborates with the WHO World Influenza Center at London. Similar collaborating centers have been or are being set up in France, Sweden, Egypt and Italy.

### 'Flu Outbreak in Alaska

An outbreak of suspected influenza among U. S. troops at Big Delta, Alaska, has been reported to the Influenza Information Center at the U. S. National Institutes of Health. Samples of blood serum from suspected cases have been sent to Fort Baker, Calif., for typing and the Territorial Health Department laboratory at Anchorage has been alerted.

Science News Letter, January 15, 1949

## PHYSICS

### Ultrasonic Waves Can Perform Many Stunts

► LABORATORY stunts with high-pitched sound waves are easily performed with simple equipment, revealed by General Electric engineers, that can be made in most any school workshop. The apparatus consists of a hollow tube, with a piston, and a source of compressed air to discharge over the tube's mouth.

The tube, with the air blowing over its

end, becomes a whistle. The simple piston can be moved up and down to regulate the pitch of the sound. When the piston is in the proper position, the whistle gives off sound waves too high-pitched to be audible to the human ear. These are the so-called ultrasonic waves. Experiments are best performed with waves of some 25,000 beats per second. The human ear cannot hear frequencies much above 17,000 beats per second.

The ultrasonic waves from the equipment are focussed to a point like light brought to a focal point by a concave mirror. When bits of cork are placed directly above the focal point, they remain suspended in the air a half wavelength apart. When cotton is held at the focal point, its particles are agitated by the unheard sound until the fabric smolders.

If talcum powder is sprinkled on a table, and the ultrasonic vibration reflected at an angle to it, the powder rearranges itself in wave patterns with ridges where the reflected vibrations meet origin vibrations direct from the whistle.

Ultrasonics have many interesting applications developed during the past few years and many more are promised. Apparatus has been built at Pennsylvania State College to give a pitch of 30,000 cycles. White mice placed in the sound field died after one minute of exposure. It kills insects also, and its possible uses range from sterilizing food, through medical treatment and eliminating the smoke nuisance, to speeding up chemical reactions.

Science News Letter, January 15, 1949



**ULTRASONIC STUNT** — Bits of cork are suspended ladder-fashion in mid-air by ultrasonic waves. The sound is coming from an air whistle, smaller than a cigarette, located two feet above the tweezers.



**OVER-SIZE CARRIER-BASED PLANE**—The Navy's newest attack plane, a Martin AM-1 Mauler, is shown making contact with the cable which will bring this largest and most powerful plane ever to operate from a flattop's deck to a swift, safe halt.

#### BIOCHEMISTRY

## Germs Hit by Inflation

► GERMS are now feeling the pinch of inflation and high living costs. This, contrary to what you think, is bad news for humans. The germs now asking for relief include such aristocratic and important ones as the mold from which penicillin is made, the Waksman strain of the *Actinomyces griseus* which yields streptomycin, TB germs descended from some isolated by Robert Koch when he discovered that they are the cause of tuberculosis.

These and some 5,000 other useful microorganisms make up the American Type Culture Collection. The collection may be compared to a library, museum, zoo or herbarium. But besides its value in this respect, it serves as a source of living material for study, research and industrial use.

Assay of many vitamins is made by testing their effect on the growth of certain species of germs. Unless the germs are pure-bred, the assay is no good. Cultures of pure-bred strains of germs for this important work can be bought, at \$2.00 per culture plus packing and postage charges, from the American Type Culture Collection.

For the same price, a cheese maker

wanting to add a special flavor to his product can get the microorganism that will do the job. Or a doctor with a patient ailing from some strange infection can get cultures to compare with the germs afflicting his patient and thus get help in identifying the cause of the patient's illness.

Income from these sources, however, is too small to maintain the collection and continue its service in the face of rising costs. The germs need daily attention and care to keep them alive and "pure" in type, generation after generation. Scientists expert enough to do this would grow stale on the job and leave unless they also had opportunities to do research of their own. Living costs have forced up their salaries as well as those of the non-scientific personnel.

A ways and means committee for the germs has now been set up by the National Research Council in Washington. The committee will attempt to develop a long-range plan for the support of the collection on a permanent basis. Meanwhile, NRC authorities declare that financial support for the year 1949 is urgently needed.

Science News Letter, January 15, 1949

#### AERONAUTICS

## Carrier-Based Heavy Plane Has Proved Successful

► THE Martin Mauler, one of the heaviest planes ever designed for use from the deck of a Navy carrier vessel, has proved successful in several hundred on-deck landings made in tests now underway in the Atlantic.

It is a one-seat, single-engine plane, with a gross weight of 22,000 pounds, a speed of 300 miles an hour, and a range of some 2,000 miles. It combines the heaviest concentration of torpedoes, rockets and machine guns ever incorporated in a single-engine carrier-based plane. Except for guns mounted in the leading edges of the wings, all armament is carried in shackles under the wings and fuselage.

The plane is powered with a Pratt and Whitney engine. It has a wing span of 50 feet, and a length of slightly over 41 feet. In the first two days of testing, more than 120 landings on a carrier deck were made.

Science News Letter, January 15, 1949

#### INVENTION

## "Super-Jeep" Light Truck Patented for Heavy Loads

► A SUPER-JEEP, a rough-tough, low-slung, flat-bedded light truck that steers as well as drives with all four wheels, may presently be asserting itself on the highways and dodging in and out at military maneuvers. The vehicle on which U. S. patent 2,457,400 has been issued to Delmar G. Ross of Toledo, Ohio, embodies a number of boldly novel features which the inventor expects to adapt for the ruggedest uses.

The framework is of tubular steel, with a completely flat platform body on which any desired kind of superstructure, seats, etc., can be placed. The driver's seat is placed directly on the platform, at the extreme front edge, with a forward-projecting footrest. Steering is by tiller instead of steering-wheel, with throttle control taken care of by a finger-lever on the tiller's hand-grip, with a flexible cable leading back to the engine, which is placed at the rear.

There are no springs; balloon tires are expected to take out the worst of the bumps—the rest you'll have to absorb yourself, in the natural way.

The inventor expects his truck to be able to carry more than its own weight over average roads. He also states that it can be parachuted from a transport plane in flight, or even "plummeted" without benefit of parachute.

Patent rights have been assigned to Willys-Overland Motors, Inc.

Science News Letter, January 15, 1949

GENETICS

# Russian Fundamentalism

The new Soviet movement which rejects Mendelian genetics is marked by a form of dogmatic fundamentalism, in the opinion of an American researcher in genetics.

► RUSSIA'S new, officially proclaimed science of anti-Mendelian genetics was assailed as being essentially a form of dogmatic fundamentalism by Prof. Richard B. Goldschmidt, University of California zoologist, in his presidential address presented at the annual meeting in Albuquerque, N. Mex., of Phi Sigma, national honor society for biologists.

Trofim Lysenko, leader of the movement in the USSR, is not a cynical and conscious faker, in Prof. Goldschmidt's opinion:

"There does not seem any doubt that Lysenko, though a clever politician, is honest and that he believes in his queer ideas, believes in them so religiously that he is willing to impose them by the sword.

"First of all, he is a fundamentalist. Just as the Christian fundamentalist believes in the divine origin and truth of every word of the Bible, Lysenko believes in every word of his gods, Marx, Lenin, Stalin, and the Russian Burbank, Michurin. He can refute every argument finally by quoting from these sources . . .

"Being a fundamentalist, he simply decides what is right and what is wrong, and there is no appeal. There is also no need to study first what he condemns, because he knows *a priori* that it is wrong."

Lysenko has three other characteristics that have helped him in getting his views officially approved and enforced in Soviet circles, Prof. Goldschmidt said. He is an "extremely clever lawyer, almost a shyster," first misrepresenting an opposing case in order later to demolish the strawman he has built. He is also a chauvinist; "There is no page without Soviet science, Soviet Darwinism, progressive Soviet scientists. The ignorant reader must believe that what he does and says is one hundred percent Soviet Russian, while all his opponents are traitors, imitators of foreign ideas, even promoters of capitalism and similar crimes." Finally, Lysenko is "a very good politician who knows very well the rules of the game."

Prof. Goldschmidt also accused Lysenko of slipshod experimental methods, and of presenting what facts he does offer in "a vague, slippery way." His experiments, declared the speaker, are made without controls, and "loaded" to make them come out in such a way as to support conclusions arrived at in advance. If there is an alternative explanation for an ambiguous result it is simply ignored.

The seeds of the present split between Soviet and Western biology were sown at

least 20 years ago. The speaker told of seeing, when in Russia in 1929, a film called "Salamandra", which made a hero of the Austrian experimenter Kammerer, who claimed he had produced inherited variations by changes in the environment. Perhaps significantly, the villain in the piece

was a Catholic priest, whose machinations made it necessary for Kammerer to flee to "the land of liberty"—Russia.

In concluding his address, Prof. Goldschmidt warned the younger members of his audience against the possibility of officially controlled science in America. Such control would not take the forms we have seen in the totalitarian countries, he pointed out, but it might nevertheless have a smothering effect on the boldness and individuality of thought that lead to pioneering efforts and great discoveries, by the sheer mass effect of drumming all scientists into huge, tightly disciplined teams at work on "projects" of essentially routine nature.

Science News Letter, January 15, 1949

ENGINEERING

# Mobile Telephone Service

► A PHONE in your car, from which you can make or receive calls while traveling anywhere in the nation, may be ready sooner than you think.

Telephone service to and from motor vehicles traveling city streets or country highways has greatly expanded since the first installation about 30 months ago and gives promise of greater expansion in the near future.

Urban mobile telephone service, as it is called, is available today in over 60 cities in the United States and Canada, and about 85 fixed transmitting stations serve highway traffic. These are the latest figures, revealed in the *BELL LABORATORIES RECORD* (Dec.), New York. First urban service was inaugurated in St. Louis on June 17, 1946, and the first highway service at Green Bay, Wis., about two months later. The urban systems in their first two years served some 4,000 vehicles, handling approximately 117,000 calls per month. Highway transmitting stations serve 1,900 mobile units and handle about 36,000 calls a month.

When highway service was first inaugurated, it was planned to operate all stations throughout the U. S. on a single channel of two radio frequencies, one for transmission to the motor vehicle and the other for transmission from the mobile unit. This was to have allowed a vehicle with the normal single-channel radio set to travel anywhere and make or receive calls. It was found, however, that skywave interference was experienced between stations separated by about 1,000 miles or more, and the plan was changed.

The country was divided into seven zones, and frequencies for use exclusively in each zone were adopted. With this plan, all stations within a zone operate on the same frequency. Vehicles traveling from one zone to another may be equipped with an additional oscillator unit with relay-switched crystals. The unit is con-

trolled by a manual selector switch mounted alongside the handset.

As the mobile unit moves into a different zone, the driver must manually switch the frequency of his equipment. Channel switching equipment is now available which is capable of being used with six different channels in the highway service band of frequencies.

Science News Letter, January 15, 1949



**GIANT APE-MAN TEETH**—Dr. Robert Broom, South African paleontologist with the University of California African Expedition, compares the new "Swartkrans Man" teeth he discovered with half of a human jaw on the table. The large tooth in front of the human jaw corresponds to the first tooth in the human jaw.

(See SNL, Dec. 11)

## MEDICINE

## Warn of Food Poisoning Danger from Pesticides

► NEW worry for the New Year: the danger of accidental poisoning through eating, along with your food, some of the new pesticides, DDT, benzene hexachloride and even the terrifically violent poison, 1080, for which there is no known antidote.

A warning of this danger was issued by Dr. James R. Wilson of Chicago, secretary of the American Medical Association's Council on foods and nutrition.

The U. S. Food and Drug Administration agrees that "it is a serious situation which calls for extreme vigilance on the part of all who put out food products and use pesticides in their establishments."

Urgently needed are: 1. Great care in use of pesticides to avoid getting them into food; 2. More knowledge of the effects of small amounts of them on human beings over long periods of time.

The danger from DDT sprayed on fruits and vegetables is not too great, Food and Drug officials say, because the fruits and vegetables are exposed to the sun. The action of the sun will decompose the DDT.

Science News Letter, January 15, 1949

## CHEMISTRY

## Enamel for Metal Alloys Ready for Extensive Tests

► A NEW enamel for some alloys of aluminum, which increases the metal's durability, utility and beauty, is now ready for large-scale evaluation tests after six years of development and trial by the Du Pont Company in Wilmington, Del.

The new enamel is vitreous. Satisfactory enamels have been developed for two alloys of aluminum known as 61-S wrought alloy and 43 casting alloy. Enamels for other aluminum alloys are promised for the future. The present new ones contain a high percentage of lead, making them unsatisfactory for coating articles that may come in contact with food.

The enamel is fired on sheets, strips and castings of the metal in furnaces like those used to apply porcelain to steel. The equipment used is substantially the same, but the temperature used with the aluminum-enameling is several hundred degrees below that employed in enameling steel.

Science News Letter, January 15, 1949

## VETERINARY MEDICINE

## Hope Vaccine Can Check Foot-And-Mouth Disease

► HOPES for eradication of foot-and-mouth disease of cattle in Mexico, expressed in a Senate subcommittee report, are based primarily on the effectiveness

of a vaccine now being injected into thousands of animals in the area of infection, Dr. H. W. Schoening of the U. S. Department of Agriculture stated.

Livestock owners who bitterly resisted the program of slaughter and burial first attempted in combating the plague are cooperating willingly in the task of wholesale vaccination, Dr. Schoening announced.

The vaccine is being produced in Mexico under the joint supervision of Mexican and U. S. scientists. It is a modified form of a European preparation known as the Schmidt-Waldmann vaccine. Large-scale production and use have been under way since last autumn.

The projected research laboratory for the investigation of foot-and-mouth disease and other infectious livestock maladies will be built even if the hoped-for total elimination of foot-and-mouth disease in Mexico is realized, Dr. Schoening added—provided, of course, the new Congress appropriates the necessary funds and designates a site.

Science News Letter, January 15, 1949

## MEDICINE

## Recovery in Mentally Ill More Lasting if Slower

► SLOWER recovery of mental patients after prefrontal lobotomy operation is likely to be more lasting than dramatically swift improvement.

Evidence for this, based on experiences of 11 patients at Elgin, Ill., State Hospital, is reported by Dr. Jack Coheen in the ILLINOIS MEDICAL JOURNAL.

The patients reached a certain stage of improvement after the operation and rehabilitation and remained at that level. Then, six months to two and a half years later, when further improvement was considered highly questionable, they began to make further progress. In many cases this phase of renewed progress is still continuing.

This contrasts with other patients who rapidly reached a good level of adjustment after the operation and were discharged from the hospital within a few weeks with everyone very hopeful that the patients would remain well. But these rapid recoveries were unfortunately followed by rapid relapses into mental illness requiring periods of hospitalization.

The operation consists in cutting nerve connections in the front of the brain. After it some patients recover to the extent of knowing where they are and of being well enough to return to their homes. But they may also be exaggeratedly cheerful, silly, self-satisfied, careless in dress, easily tired, and unconcerned. It was after a period at this stage that the patients Dr. Coheen observed began to show further progress toward normal attitudes.

Science News Letter, January 15, 1949

# IN SCIENCE

## NUCLEAR PHYSICS

## No Hollywood Touch in Scintillating Research

► IF ATOMIC scientists start talking about "scintillating research," don't think that a Hollywood huckster has gotten into nuclear physics. The scintillation counter is one of the newest devices for detecting radioactive radiations.

Plans for attacking atomic mysteries with the scintillation counter were revealed by Dr. George B. Collins of the University of Rochester. Scintillation experiments will be made, using the University's new cyclotron which is nearing completion.

The scintillation counter is not as glamorous as the name indicates. Heart of the radiation detector is a substance such as naphthalene, the stuff from which mothballs are made. When a radioactive atom passes through the mothball chemical, it makes a flash of light. The flashes are counted with a photomultiplier tube.

For detecting certain types of atomic rays, this method is 10 times as sensitive as the famed Geiger counter, Dr. Collins explained.

Science News Letter, January 15, 1949

## NUTRITION

## Feeding Weeds to Rabbits Will Cost You Calories

► EFFORTS to get more food for less cost can go too far. The one which called for feeding rabbits on weeds, thus converting waste feedstuffs into valuable human food, stopped even the austerity-driven British.

It costs too much in calories, is the verdict of a British nutritionist, J. C. D. Hutchinson, who tried it out.

Weed-fattening one rabbit costs the rabbit keeper 1,022 calories of energy in gathering the weeds. When he eats the rabbit, all he gets is 549 calories. Result on the red-ink side of the ledger: a loss of 473 calories for the weed collector.

If the rabbit keeper feeds his rabbits on weeds plus potatoes, he comes out a little better. The gain is 556 calories from one weed-plus-potato fattened rabbit.

But to maintain himself on weed-fed rabbit meat alone, the rabbit keeper would have to spend 23 out of 24 hours collecting enough weeds to feed enough rabbits.

"In this case," Mr. Hutchinson points out, "the rabbit keeper is faced with a choice of starvation or sleeplessness."

His calorie-cost-accounting studies on weed-fed rabbits are reported to American nutritionists in NUTRITION REVIEWS (Jan.).

Science News Letter, January 15, 1949

## SCIENCE FIELDS

## CHEMISTRY

**Man-Made Clouds of Dust May Cleanse Air of Fumes**

► MAN-MADE clouds of dust may be weapons against the poisonous fumes that can form death-dealing smog such as struck Donora, Pa., recently.

How clouds of dust can purify air laden with potent droplets of sulfuric acid was described by Drs. H. P. Meissner and H. S. Mickley of the Massachusetts Institute of Technology to a chemical engineering symposium of the American Chemical Society in Cambridge, Mass.

The clouds are made up of porous materials such as clay or silica gel. These materials absorb mist which escapes mechanical anti-pollution devices, the scientists explained.

Cyclone towers, settling chambers and sprays are effective in preventing dangerous dust from getting into the atmosphere, they pointed out. But stable substances such as sulfuric acid mist are not captured.

Using a turbulent cloud of dust particles as a filter, 95% of the sulfuric acid mist was removed from the air in a test reported by the scientists.

Although clouds of dust are one form of atmospheric pollution, the dust used as a filter is coarser and less likely to get into the air. In operation in a factory flue, a small side stream of the dust would be withdrawn as fresh material was added, forming a continuous filter of air bearing hazardous mist.

Because of costs, the new method is not expected to replace older systems except where it has economic advantages.

Science News Letter, January 15, 1949

## ORNITHOLOGY

**Ten-Year Search Unravels Tale of Russian Goose**

► NOT ALL fliers coming out of Russia are aviators escaping (or deserting, depending on the point of view) from behind the iron curtain. One such story, that began 10 years ago and has only now had its final chapter written, is told by J. A. Neff of the U. S. Fish and Wildlife Service, in the Western bird student's journal *Condor* (Nov.).

In November, 1940, J. M. Williams of Gridley, Calif., shot a goose of a kind he had never seen before. On its leg was a metal band with the identifying inscription: "510H-Moskva-13152B". He sent the band to Mr. Neff, who recognized it as of Russian origin.

However, war between Germany and the USSR broke out about then, so that it was 1946 before further pursuit of information about the band became possible. Many months later, Mr. Neff had a letter from A. Tugarinov, ornithologist of the Soviet Academy of Sciences.

The band, Mr. Tugarinov stated, was one of a series issued to a Capt. G. Grinberg in 1938-39. This officer was then on duty on the Chukche peninsula, the northeasternmost point of Siberia. Subsequently he was killed in the war, and all his papers were lost, so that no record of the banding of this goose was recovered. From Mr. Williams' description, however, the bird was recognized as an emperor goose, native to northern Asia but rarely seen in America.

Science News Letter, January 15, 1949

## POPULATION

**Expert Says World Can't Feed Present Population**

► THE WORLD can't support its present population—not even at a minimum level. This is the conclusion of Guy Irving Burch, editor of the *POPULATION BULLETIN* (Dec.).

And if everybody in the world were to have as high a level of living as the people in the United States, the population of the world would have to be reduced at least two-thirds, he says. Or the means of support would have to be increased at least 200%.

It is estimated that there are about four billion acres of arable land in the world. Not all of this is being cultivated. Not all can be under present conditions. But if every inch were in use, it would support only about 1,600,000,000 people. The earth's population is already 2,250,000,000.

That leaves 650,000,000 mouths without food even if all our dinner tables were stripped of everything but the barest essentials.

And the world's population is growing. The Census Bureau has just announced an estimated increase of 3,000,000 for the United States during the year 1948 and a 12.5% increase in the last decade. The world population is increasing, Mr. Burch says, at the rate of about 200,000,000 each ten years.

If all the people of the world could live as well as do the people of the United States, the earth could not support more than about 750,000,000 people. That is about one-third of the present population.

"If each family in the world had a fair-sized house with its own yard," says Mr. Burch, "had meat to eat at least once a day and an adequate supply of fruits and milk; had proper medical care and lived in a healthful and stimulating climate, it is doubtful whether all these good things of life could be spread over more than 500,000,000 people at the present time."

Science News Letter, January 15, 1949

## GENERAL SCIENCE

**Foreign Countries To Buy Books with UNESCO Coupons**

► BOOKS to replace the ones burned by fascist dictators or otherwise destroyed in World War II will be purchased in this country by persons in dollar-shy nations with coupons furnished by the United Nations Educational, Scientific and Cultural Organization.

Operation of the UNESCO's book coupon scheme in this country was described by Dr. Milton S. Eisenhower, president of Kansas State College and chairman of the U. S. National Commission for UNESCO. Dr. Eisenhower announced that the American Booksellers Association will administer the program in the U. S.

Under the new scheme, coupons are allotted to countries lacking the foreign exchange requirements for purchases in so-called "hard" currency countries, such as the U. S. These coupons are honored for the purchase of books and redeemed in the bookseller's currency by UNESCO.

In this country, publishers will accept the coupons from foreign purchasers and be paid for the coupons by the Association. The Association, probably operating through a special, non-profit body to be established for the purpose, will redeem the coupons at UNESCO headquarters in Paris.

First coupons have already been delivered by UNESCO in Paris, and \$150,000 has been allocated to get the program underway. Of this sum, \$50,000 will be donated by UNESCO to Austria, China, Czechoslovakia, Greece, Hungary, Italy, Indonesia, Iran, the Philippines and Poland. The remaining \$100,000 worth of coupons is slated to be put on sale in China, Czechoslovakia, France, India, Poland and the United Kingdom.

Science News Letter, January 15, 1949

## ENGINEERING

**U. S. Motors Will Help Tap Italian Underground Water**

► UNDERGROUND water, near red-hot lava beds not far from Milan, Italy, is to be tapped with the aid of American machinery to obtain high-pressure steam to operate turbine electric generators.

An order has already been given to the Westinghouse Electric International Company for two 300-horsepower mud pump motors and one 250-horsepower draw-works motor for use on the drilling rigs.

Engineers calculate that they can strike hot water under sufficient pressure to support a one-inch column a mile high. At the surface, owing to reduction in pressure, this water will turn to steam, which will be piped into the turbines. Eight additional drilling rigs are to be purchased soon.

Science News Letter, January 15, 1949

## ENGINEERING

# Gas from Unmined Coal

**Burning underground layers of coal too thin for mining has yielded good fuel gas. This new process is undergoing its second experimental trial in the U. S.**

By A. C. MONAHAN

► WHY dig coal when it can be made to yield fuel gas merely by burning it underground as it occurs in nature? The answer is simple. The burning process is uneconomical where ordinary operations can be carried out but it seems worthwhile with coal layers too thin for mining.

The process is new. In America it is now undergoing the second experimental trial. In the first, it was proved that gas suitable for firing boilers can be obtained. The gas is also suitable for a source material from which to make synthetic liquid fuels. In this second trial the objective is to find ways to get more gas, better gas and cheaper gas than produced in the first tryout.

This experiment in burning underground coal as it occurs in its natural layers is a joint undertaking of the U. S. Bureau of Mines and the Alabama Power Company. It is being carried out on coal property at Gorgas, Ala., owned by the latter. The first trial was made during 1947. The results are so encouraging that a second testing is now underway.

It is not the thought of the government officials or of the coal operators that underground burning will replace the present types of mining. It is a process for application with coal seams too thin for economical mining and with coal veins too difficult or uneconomical to mine for other reasons.

### Combustible Gases

Basically, the scheme used to obtain combustible gases from coal burning deep in the earth consists of drilling down from the surface through the layer of coal. Fire is started by dropping an incendiary bomb down one or more drill holes. Air, under considerable pressure, is forced down the same hole or holes to feed the fire. The same pressure forces the gases of combustion into other drill holes and up to the surface.

There the gases are captured and stored, and then may be shipped by pipeline to fire furnaces or used near the location of production to develop electricity. One highly desirable utilization is for the production of synthetic fuels. The process involved is almost identical with that now followed in making heating fuels and gasoline from natural gas.

The 1947 trial was made in a three-foot layer of coal about 30 feet under the surface of the ground. The second trial is to

be made in another thin layer, but one that is about 100 feet underground. The earlier experiment showed that the underground combustion can be maintained and controlled, that coal in place can be gasified completely, and that the roof rock settles behind the burning face without cutting off the air or gas.

The gas obtained is a cheap source of carbon monoxide and hydrogen. However, it had a lower heating value than desired. This was thought to be due to leakage of gas and air pressure through cracks and breaks in the 30-foot layer of earth over the burning seam. A leakage is not expected in the second trial because the 40-inch seam to be burned is 100 feet below the surface.

In the 1947 experiment, not only air under pressure was used to support the combustion. Various mixtures were tested. An oxygen-enriched air blast gave excellent results as did also oxygen-steam-air blasts and oxygen-steam blasts. All will be tried again in the new trial. It is thought that better-quality products will be obtained with the use of oxygen and steam.

### Coal Burning

To many it might seem that if the coal underground is actually burned, the gases obtained would have no value for heating and power. If complete combustion occurred this might be true, by complete meaning what takes place in a properly managed furnace where both solids and gases are consumed. Plenty of oxygen is essential for complete combustion. Otherwise gases formed, or distilled out of the coal by the heat, are burnable.

In the manufacture of coke from bituminous coal great volumes of combustible gas are obtained as a by-product, and this gas has high heating value. The carbon monoxide from the household stove, responsible for many deaths, is a combustible gas from the coal, a result of incomplete combustion.

Manufactured gas, widely used in America in locations in which natural gas is not available, is another example of gas from coal. Two kinds are used, coal gas and water gas, but both are made from coal. In the first, coal is heated in retorts in the absence of air. The so-called water gas is made by passing steam through coke that has been heated white hot. A-chemical action takes place, which produces a mixture of carbon monoxide and hydrogen. Coal gas is largely methane and hydrogen.

Natural gas is largely methane.

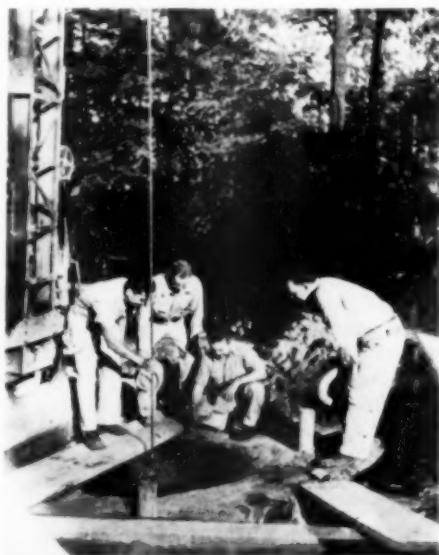
In the Alabama underground coal-burning experiment the combustion is under control. Cutting its supply of oxygen extinguishes it. However, there are many underground coal fires that are not under control. They may be called accidental fires, man-made but through carelessness. They originated at coal outcrops from bush fires, or in abandoned mines from burning debris. Many have been burning for years. Air enough to supply oxygen for combustion keeps them alive. No attempts have been made to capture and harness the gases given off, but it may be tried when the Alabama experiments are completed.

### Swedish Experiment

Underground fuel without mining is being obtained in Sweden in an experiment paralleling the Alabama undertaking, but it is from heat, not fire. Electrical heaters, in deep drill holes into layers of oil shale, are distilling the oil from the shale, permitting it to escape in gaseous form to the surface for capture, refinement and use.

The electrical resistance heaters dropped into the holes require some three months to warm up the oil shale. This is followed by a two-month oil vapor production period. The process is pronounced by American scientists to be feasible here but too costly. Sweden has cheap hydroelectric energy close to its oil shale deposits. Underground coal-burning is an easy process.

Science News Letter, January 15, 1949



**GASIFYING COAL**—A large-bore hole is sunk to the coal seam in the second trial at the Alabama underground coal-burning experiment.



**SEAM TO BE BURNED**—Project officials discuss the operation in an entry driven into coal seam in the present experiment.

## ENGINEERING

## Recommend Cinders on Ice

► CINDERS are better than sand to aid automobile traffic on icy roads, the Highway Research Board of the National Research Council in Washington indicates in a bulletin. Cinders are sharper than sand and cling to tires and cut into ice better than sand particles, it says.

The melting or embedding action of cinders with their greater porosity is better than sand because of the larger quantity of moisture and chloride held at or near the surface of the cinder particles, the report continues. Due to their dark color cinders absorb more heat than sand when the sun is shining, which results in greater embedment.

The title of the bulletin is **RECOMMENDED PRACTICE FOR SNOW REMOVAL AND TREATMENT OF ICY PAVEMENTS**. It was prepared particularly for public officials whose duties include keeping highways and streets clear for winter travel. It presents recommendations for organizing the road-clearing program, drift control, markers for drainage and structures, use of weather reports, night patrols, types of equipment, and aids to traffic such as abrasives and the chemicals.

Abrasives, whether cinders, sand or washed rock screenings, should be chemically treated with common salt or calcium chloride when put in storage to be available for winter use. Such treated abrasives become anchored to the ice or packed snow

and do not blow away as easily as untreated materials. Either of these chlorides, when completely dissolved and uniformly mixed with the abrasive, prevents freezing and the abrasive is ready to handle in extremely cold weather.

Stockpiles of cinders, sand or other materials, placed along highways for ready use when needed, should be protected by some type of covering from wet weather. Otherwise, there is danger of their freezing. While the treatment with chloride prevents freezing for a period, the chemicals will leach out in time if not in water-tight storage.

Dry chloride can be applied directly to the road surface. This is done mostly on city streets where heavy traffic compacts the snow before it can be removed. An application of from 300 to 500 pounds per mile of two-way highway, spread for about two feet along the center line, is usually sufficient. On portland cement concrete, these salts should be used sparingly, because they may cause surface pitting in the paving.

Science News Letter, January 15, 1949

Automobiles of today may look bigger than prewar types but few actually are; they have more interior room, without significant change in over-all dimensions, by moving engines forward and widening bodies to cover former fender space.

**"There are no problem children, only problem environments and parents."**

## EMOTIONAL MATURITY

by LEON SAUL, M.D.

An authoritative book that presents a wider understanding of the minor mental neuroses from which no one is entirely free. This is not a study of the extremes of insanity, but of the neurotic tensions and vulnerabilities within a person that through the pressure of unfavorable circumstances can drive him to the breaking point.

These neuroses, which may either color or distort a personality, are shown to originate in the attitudes and feelings developed in the parent-child relationship and carried, usually unconsciously, through life. Dr. Saul has taken liberal examples from case histories to explain his points and many of them are from his extensive work with veterans.

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## MEDICINE

# Mystery Ill Under Attack

► MS stands for multiple sclerosis. The letters could also stand for Mystery Sickness, because the disease is truly mysterious. It has baffled the medical profession for years.

Greatest immediate promise for helping victims of MS comes from the field of physical medicine, Dr. H. Houston Merritt, director of the Neurological Services of the New York Neurological Institute, declared.

This and other phases of the attack on MS were discussed by Dr. Merritt and Dr. Cornelius H. Traeger, medical director of the National Multiple Sclerosis Society, as guests of Watson Davis, director of Science Service, on Adventures in Science, radio program presented under the auspices of Science Service over the Columbia Broadcasting System.

A healthy young man woke up one morning to see two tassels hanging from his window shade, two windows, two doorways. A blooming young office secretary found herself staggering and stumbling as she walked to work. Observers dismissed her as an alcoholic. A physical education instructor discovered her right arm was growing numb over night. In the course of a week she could no longer use it.

Those are some of the ways MS affects its victims. The exact cause of the condition is not known. The mechanics of it consist in destruction or dissolution of the myelin which sheathes nerves like the insulation on an electric wire. The myelin destruction is spotty. Many areas are scattered indiscriminately throughout the brain and spinal cord.

Without its insulating myelin, a nerve

cannot properly transmit impulses. If the impulses are stopped completely, paralysis of the part of the body served by the nerve results. If the impulses pass through the nerve in a feeble or changed way, parts of the body function in a disturbed fashion. The victim has speech defects, staggering gait, tremors, and so on.

MS strikes down young people usually between the ages of 20 and 40. Many of its victims face eventual immobility and helplessness which make them dependent on others for even the daily routine bodily functions.

New drugs, electrotherapy, physiotherapy and rehabilitation are now under trial as treatments for MS.

"The greatest immediate promise," Dr. Merritt said, "is in the field of physical medicine, whereby weakened muscles can be re-educated, muscle atrophy from disease can be prevented, neuromuscular coordination can be restored and patients can frequently be made self-supporting for long periods.

"A young member of the society who was completely incapacitated is now an editor of a small town newspaper, drives his own car and is raising a family."

Science News Letter, January 15, 1949

## CHEMISTRY

## Patents on Shale-Oil Listed for Specialists

► SHALE-OIL patents issued by the U. S. Government, both to Americans and others up until 1945, are listed, illustrated and described in a new publication of the U. S. Bureau of Mines. The bulletin will be of particular value to scientists, inventors and industrialists seeking the answer of how to get from this mineral the gasoline, fuel oil and organic chemicals needed to supplement petroleum products.

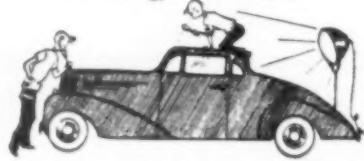
The title of the bulletin is AN INDEX OF SHALE-OIL PATENTS. It was prepared by Dr. Simon Klosky, shale-oil chemist of the Bureau's staff. Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., for 75 cents. It is not available from the Bureau. A companion volume of later patents will be ready in about a year.

The study made in compiling this publication has one special application to Bureau activities. In the Act of Congress, authorizing the construction and operation of demonstration plants to produce synthetic liquid fuels, the Secretary of the Interior is also authorized to acquire technical data, inventions . . . and other rights and licenses under patents granted by this or any other nation.

Science News Letter, January 15, 1949

### CAR BUYERS BEWARE

#### Don't Get "Stuck!"



Do you know the 36 tricks used to defraud new and used car buyers? A fair price to pay? A fair trade-in? Fair financing and insurance? The costs of running a car? How to spot a "lemon"? A stolen car? These and many other questions are clearly answered in the 96 easy-to-read pages of:

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## Science Service Radio

► LISTEN in to a discussion on "World Science" on "Adventures in Science" over the Columbia Broadcasting System at 3:15 p.m. EST, Saturday, Jan. 22. Dr. Jaime Torres Bodet, formerly foreign minister of Mexico, new director-general of UNESCO, and Frank J. Malina, aeronautical engineer on leave from the California Institute of Technology who is the American on the staff of the UNESCO natural sciences division, will be guests of Watson Davis, director of Science Service. They and other international specialists gathered in Paris will tell of the world-wide program of science being undertaken by UNESCO. The program will carry the first announcement of a new Arid Zone Institute being established to consider scientific problems of the deserts of the Near East. There will also be news of world conferences on the protection of nature and the conservation of natural resources to be held in the U. S. the coming summer.

Science News Letter, January 15, 1949

## DON'T WAIT FOR TOTAL DEAFNESS

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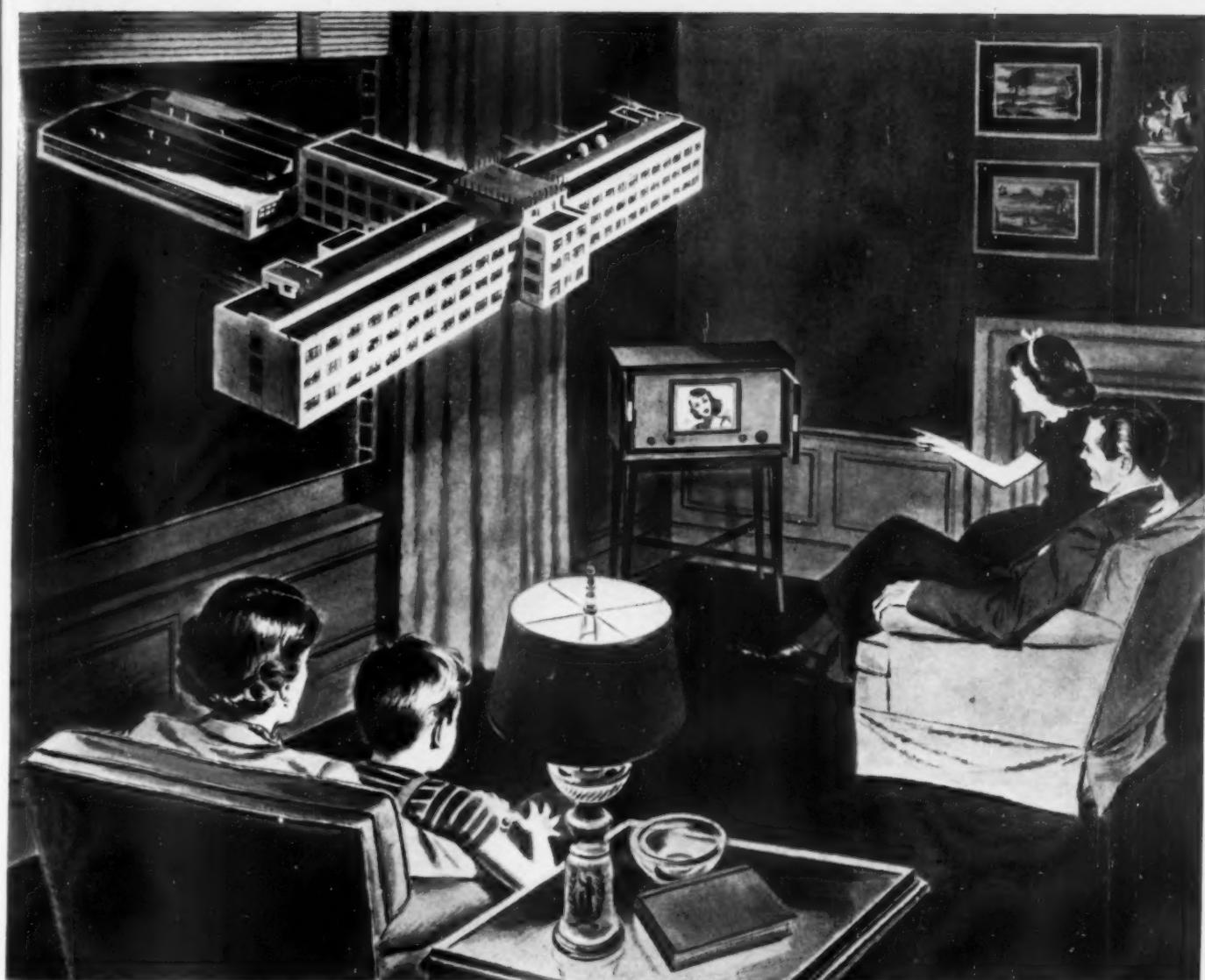
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ing the past 30 years was pioneered by RCA.

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Actually, there are *hundreds* of examples of RCA leadership in radio and electronic research and engineering "know-how" . . . that give *value beyond price* in any product or service of RCA or RCA Victor.

When in Radio City, New York, you are cordially invited to visit the radio, television and electronic wonders at RCA Exhibition Hall, 36 West 49th Street. Free admission. Radio Corporation of America, RCA Building, Radio City, N. Y. 20.

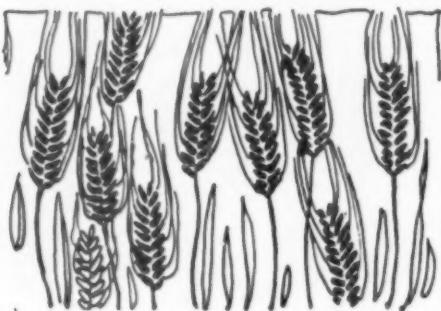


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## AGRICULTURE

# NATURE RAMBLINGS

by Frank Thone



## Bread From Snow

► ABOUT this time of winter, farmers all the way from the Great Plains to the upper Ohio valley are looking anxiously at their fall-sown grain fields and at the gray skies overhead. For the depth of the snow that covers winter wheat now will

have a great deal to do with the height to which the national grain-bin will be filled next summer.

Most comforting sight, to a farmer's eyes, is a field deeply covered with soft, loose snow, especially if there is reasonable prospect that it will stay that way, and even have more snow heaped on top. There is an old English weather proverb that says:

"A foot deep of rain  
Will kill hay and grain,  
But three feet of snow  
Will make them grow moe."

A good thick blanket of snow over winter grains and other perennial and biennial plants does not "keep them safe and warm," as nursery jingles used to tell us. It will keep them safe, but not warm; obviously, if there were warmth above the melting-point of ice (which is pretty chilly) the snow would disappear.

Snow keeps the plants beneath it safe by doing two things. First and probably most important, it very greatly reduces evaporation from the dormant plants, which can go on at a really dangerous rate if they are left exposed to the dry, cold winter winds. Second, because of its loose, air-filled structure, soft snow acts as a reasonably good thermal insulator, preventing to a considerable extent the violent fluctu-

tions in temperature that occur near the surface of bare soil. This in turn abates the danger of "heaving"—the expansion and contraction of the soil as it alternately freezes and thaws that can shear the roots off exposed wheat plants and even turn them upside down and thus leave them to perish.

Glaze ice over the surface of the snow, caused by partial thawing followed by refreezing, or by rain that freezes as it falls, is almost as bad as complete loss of the snow cover, especially if the glaze forms when the snow is thin. Over-wintering plants with exposed leaves, like all the winter grains, are not dormant in the proper sense of the term. Their leaves want at least a little oxygen, and a crust of ice prevents the minimal air circulation they need.

Finally, when the winter is ended, the accumulated snow becomes a highly beneficial source of water for renewed growth, especially if the spring thaw is gradual and lets all the moisture "stay put" in the soil and not flow away wastefully as runoff. Then the proverb's "three feet of snow" (which incidentally will not as a rule produce nearly as much water as "a foot of rain") will be right where it will do the plants' fresh start the most good, and "make them grow moe."

Science News Letter, January 15, 1949

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## ASTRONOMY

## Red Supergiant Stars

► RED supergiant stars were once numerous in systems of billions of stars where they are now extinct, Dr. A. E. Whitford of the University of Wisconsin suggested to the meeting of the American Astronomical Society in New Haven, Conn.

Dr. Whitford used photoelectric apparatus on the 100-inch telescope atop Mount Wilson to study the light that left distant galaxies in the Corona Borealis cluster 130,000,000 years ago.

In the Corona cluster, spiral-shaped galaxies like our own Milky Way in those days had about the same color as nearby similar spirals have now, he found. But the non-spiral galaxies, called elliptical galaxies by astronomers, turned out to be redder than nearby samples of the same kind.

The nearby ellipticals are known to be nearly devoid of red giant stars. This difference, according to a suggestion by Dr. Martin Schwarzschild of Princeton University Observatory, is to be explained by the red supergiants which existed 130,000,000 years ago, but have since consumed their store of energy and ceased to shine visibly.

Astronomers have known for years that nearby red supergiants, like Antares and Betelgeuse, are spendthrift stars, and because of their relatively short life must be younger than the sun. The young stars are presumed to have condensed relatively

recently out of the gas and dust present between the stars of the Milky Way, and between the stars of other galaxies.

The non-spiral galaxies lack this raw material for new stars. Supergiants present originally would therefore not be replaced, and would gradually become extinct.

Thus, although stars change too slowly for humans to see any evolution in an individual star, the vast distances to other galaxies may be used to study the "ancient history" of the universe.

Science News Letter, January 15, 1949

## INVENTION

## Pneumatic Artificial Hand Gets Power from Armpit

► AN ARTIFICIAL hand with working fingers that look as natural as the purely cosmetic ones sometimes seen is offered by Frank L. Dale of New York for patent 2,457,305. Motive power for flexing the fingers is provided by a pneumatic bulb strapped in the wearer's armpit, with a tube leading to a cylinder-and-piston arrangement in the palm portion of the hand. A series of levers and lines that flex the fingers are moved in varying degrees according to the pressure applied on the bulb and the position taken by the arm to which the hand is attached.

Science News Letter, January 15, 1949

# Books of the Week

TO SERVE YOU: To get books, send us a check or money order to cover retail price. Address Book Dept., SCIENCE NEWS LETTER, 1719 N St., N. W. Washington 6, D. C. Ask for free publications direct from issuing organizations.

CATION EXCHANGE IN SOILS—Walter P. Kelley—*Reinhold*, 144 p., \$4.50. Of interest to the soil scientist, agronomist, and the chemist that is concerned with the processes taking place not only in soils, but in rocks and minerals, soaps, certain resins and many other organic substances.

DESIGN FOR WELDING—Robert S. Green, Ed.—*James F. Lincoln Arc Welding Foundation*, 1024 p., illus., \$2.00. A reference book intended to present a record of representative welded designs. Contains 82 papers.

EXPLORING BIOLOGY—Ella Thea Smith—*Harcourt, Brace*, 3d ed., 607 p., illus., \$3.28. A high school text made vivid by a wealth of photographs and drawings.

THE FLIGHT OF BIRDS: Analyzed Through Slow-Motion Photography—John H. Storer—*Cranbrook Institute of Science*, 94 p., illus., \$2.50. Interesting information for bird lovers and those concerned with the problems of flight

and containing a table of bird speeds ranging up to 175-180 miles per hour when pressed by an airplane. The photographs are beautiful.

INSTALLATION AND SERVICING OF LOW POWER PUBLIC ADDRESS SYSTEMS—John F. Rider—*Rider*, 204 p., illus., \$1.89. A practical book for those who want to enter a new field of servicing.

THE NATIONAL RESEARCH COUNCIL REVIEW 1948—*National Research Council of Canada*, 216 p., illus., paper, 75 cents. Annual reports of the scientific divisions of the Council, including the atomic energy project.

THE UNIVERSE AND DR. EINSTEIN—Lincoln Barnett—*Sloan*, 127 p., illus., \$2.50. An understandably written description of Dr. Einstein's eminent place in the world of science and the view of the universe that his work has made possible. Much of the book appeared in serial form in *Harpers*.

Science News Letter, January 15, 1949

fig growers, is announced by Dr. Rene Blondeau, Shell Oil Company agricultural researcher, and Dr. Julian C. Crane of the University of California's Experiment Station at Davis, Calif., in *SCIENCE* (Dec. 24).

The synthetic hormone used was a chemical cousin of 2,4-D which might appropriately be called 2,4,5-T for short—its full name is 2,4,5-trichlorophenoxyacetic acid. Sprayed on fig branches that were ready to develop figs but had not yet been visited by the pollinating wasps, it caused the development of seedless but well-flavored and otherwise perfect figs. Ripening time was shortened from 120 to 60 days.

In the same issue of *SCIENCE*, Drs. G. S. Randhawa and H. C. Thompson of Cornell University tell of producing bigger, redder, tastier tomatoes by spraying the soil in which the plants grew with three different growth-promoting chemicals. The later-produced tomatoes were also seedless.

Science News Letter, January 15, 1949

## ASTRONOMY

# Star Clusters Disrupting

► SOME clusters of stars in the Milky Way galaxy may be disintegrating while others are becoming denser and more strongly clustered than ever, if the studies of Udo Van Wijk, of Harvard College Observatory, are correct.

Clusters such as the Hyades and Pleiades, observable these evenings in the eastern sky in the constellation of Taurus the Bull, are subject to two opposing effects, Mr. Van Wijk pointed out at the meeting of the American Astronomical Society in New Haven, Conn.

First there are the inevitable encounters which take place between the stars in the cluster and field stars, since both the clus-

ter and the field stars move through space. These encounters tend to disrupt the clusters over long periods of time.

Within each cluster itself, however, there are internal motions. Some stars may build up so much energy and speed as to escape from a particular cluster, thereby taking energy away from the cluster and causing it to condense to a smaller total volume.

In the case of the Pleiades, and also for the cluster in Cancer known as the Beehive, Mr. Van Wijk finds that the effect of escape of stars is from 20 to 30 times as large as the effect of encounters with field stars. Although the uncertainty in this figure is rather high, it indicates that the density of galactic clusters like the Pleiades and the Beehive is probably increasing.

On the other hand, the Hyades, a V-shaped group which forms the face of Taurus, are already considerably dispersed and will probably eventually become disintegrated by encounters with field stars.

Science News Letter, January 15, 1949

## BIOCHEMISTRY

### Speed Up Fig Ripening by Growth-Control Spraying

► CHOICE Calimyrna figs can now be produced in two months instead of the usual four, and without the help of the little gnat-sized wasps that have hitherto been necessary for their fertilization and development, by spraying their unpollinated beginning stages with a growth-promoting substance.

This result of experimental work, of great potential importance to American

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KEY CARRIER, with two key chains connected by an ingenious coupling device, makes it possible to leave the ignition key in the automobile lock while using another key to open the trunk compartment. The two halves of the coupling device are separated by a slight tug on a little red-edged collar.

Science News Letter, January 15, 1949

CHLORINE SOLUTION feeder, to add the sterilizing chemical to water flowing under pressure through a pipe, is housed in a transparent plastic container so that the hypochlorite solution can be seen as it leaves the feed nozzle and enters the water. It feeds only when wanted, and it feeds accurate quantities even in very small amounts.

Science News Letter, January 15, 1949

RADIO TRANSCEIVER, shown in the picture, is an improved version of the famous wartime walkie-talkie for two-way person-to-person communication. It is about one-fourth the size of the war instrument. The pocket-sized radio station held in the



hand is complete except for the earphones and small-sized batteries.

Science News Letter, January 15, 1949

FIRE EXTINGUISHER, a dry chem-

ical powder type designed for use against flammable liquids and electrical fires, utilizes carbon dioxide under pressure to drive the dry powder mixture 20 feet or more in the flame. It is a 20- or 30 pound hand-carried device in which the gas and powder are released by a trigger.

Science News Letter, January 15, 1949

AIRFIRE GUN, sub-machine type, is designed to use a ping-pong ball for a bullet. The firing handle is a movable section which rides along a central steel rod and a flat wooden support, both attached to a plastic gunstock. The ping-pong ball is placed against a rubber ring in a cup at the end of the muzzle.

Science News Letter, January 15, 1949

TELEVISION TUBE tester, a recording spectroradiometer, will accurately plot the full range of visible light produced on a television tube. It analyzes the components of the light by measuring and recording the degree of output of all visible light wave-lengths progressively. The process, entirely automatic, requires less than a minute for each tube.

Science News Letter, January 15, 1949

## Do You Know?

Cooking utensils consume about 9% of the aluminum produced in America.

Australians have never experienced a "White Christmas"—it is summer time in the Southern Hemisphere when Christmas comes.

Approximately 240 of the 687 commercial frequency modulation (FM) broadcasting stations in the United States are owned outright or in part by newspapers.

When a proper amount of sodium dichromate is added to salt used to keep streets clear of ice and snow, automobile bodies are protected from the corrosion that otherwise often results from the picked-up salt and water mixture.

The reason why sound makes less progress when traveling through sea water than through fresh water is now thought to be due to slight amounts of magnesium sulfate in the salt water; this chemical seems to have unusual sound-absorbing ability.

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